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## Tumor Implantation at Port Site of Video-Assisted Thoracoscopic Resection of Pulmonary Metastasis

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VIDEO-ASSISTED thoracoscopic surgery is being used with increasing frequency by thoracic surgeons to treat intrathoracic disease. This approach offers the clear advantage over open thoracotomy of less postoperative pain and

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an earlier return to preprocedure levels of activity.<sup>1</sup> Early experience indicates that the two approaches are equally effective when used to treat benign pleural or pulmonary disease, but two concerns are evident when video-assisted thoracoscopic surgery is used to treat malignant parenchymal problems.<sup>2,3</sup> First, video-assisted thoracoscopy precludes a complete examination of the lung that is essential to detect synchronous nodules.<sup>4</sup> Second, there is a growing number of reports of port-site tumor implantation noted during the follow-up period.

We present the cases of three patients with port-site tumor implantation following the wedge resection of pulmonary metastasis by the video-assisted thoracoscopic surgery approach. We also discuss the comparative effectiveness of the two approaches in the surgical treatment of metastasis to the lungs.

### Reports of Cases

#### Patient 1

The patient, a 66-year-old woman, was referred for the surgical evaluation of a 1.5-cm cavitary right upper lobe nodule. Thirty years previously, she had undergone a right total parotidectomy and radical neck dissection for a mucoepidermoid carcinoma and, ten years previously, radiation treatment of a local recurrence. A fine-needle aspiration biopsy showed adenocarcinoma. She underwent a video-assisted stapled wedge resection with the use of three incisions. The mass was not placed in a plastic bag before removal and was removed through the middle incision. The chest tube was brought out through the anterior incision. The surgical margins were free of tumor, there was no spillage, and saline solution was used to irrigate the thoracic cavity. Five months later, chest wall recurrence developed at the camera port site. The chest wall was resected, and she was given adjuvant radiotherapy. Her disease has subsequently recurred, and she has elected not to undergo further treatment.

#### Patient 2

The patient, a 20-year-old man, was seen 24 months after a right above-the-knee amputation for osteogenic sarcoma of the proximal tibia. A chest x-ray film at that time showed three pulmonary nodules measuring between 1 and 2 cm, two on the right and one on the left. They were removed using a video-assisted thoracoscopic approach. Two were excised with electrocautery and a visceral pleural closure. The third was excised using the linear stapling device. The specimens were not placed in a plastic bag before being extracted. The pathologic margins were free of tumor, and the pleural cavities were irrigated with saline solution. Five months later, the patient presented with a mass in the central right port site and a new right parenchymal lung nodule. He died two months later of uncontrolled right thoracic tumor recurrence.

#### Patient 3

The patient, a 40-year-old man, underwent colectomy for poorly differentiated colon carcinoma, stage T2N2M0.

**ABBREVIATIONS USED IN TEXT**

CEA = carcinoembryonic antigen  
CT = computed tomographic

A year later, a 1.5-cm nodule was seen on a chest x-ray film in the periphery of the right lower lobe, and a carcinoembryonic antigen (CEA) level of 130  $\mu\text{g}$  per liter was noted. Through three small right chest incisions, the nodule was resected using the linear stapling device and removed through the middle incision after being placed in a protective plastic bag. The surgical margins were clear, and the thoracic cavity was irrigated with sterile water. His serum CEA level rapidly returned to normal.

Ten months later, the patient presented with 4-cm masses in the middle and posterior incisions. Fine-needle aspiration biopsy showed adenocarcinoma of both masses, and they were resected along with the proximate chest wall. Twelve months after the operation, the patient was doing well, and his CEA level had returned to normal.

**Discussion**

The development of minimal access surgery during the past decade has been dramatic. The progressive development of specialized equipment has made this approach more versatile, effective, and safe. With these improvements, video-assisted techniques are used to accomplish surgical objectives that previously required open thoracotomy. The challenge confronting surgeons is to show that these new techniques are, at a minimum, equal to established ones in safety and effectiveness. Early results indicate that video-assisted thoracoscopic and open thoracic procedures are equally effective when used to treat benign pleural and pulmonary diseases, but serious concerns regarding the effectiveness of thoracoscopic surgery in treating malignant parenchymal disease remain.

When a patient with previously successful treatment of a nonpulmonary tumor presents to a surgeon for the treatment of a new pulmonary nodule or nodules discovered by chest x-ray film or computed tomographic (CT) scanning, the patient undergoes a biopsy of this disease with a fine needle or flexible bronchoscope. The thoracic surgeon's responsibility is to remove all disease from that hemithorax. Because chest x-ray films and CT scans do not detect 30% of the disease in hemithoraces,<sup>4</sup> the surgeon must visually inspect and palpate the entire lung and chest cavity to accomplish this goal.<sup>5</sup> Leaving gross disease behind subjects the patient to all of the risks of the procedure while denying any chance for long-term control or cure. The video-assisted thoracoscopic approach does not allow for this critical evaluation.

An additional concern regarding the effectiveness of video-assisted thoracoscopic surgery compared with thoracotomy in resecting pulmonary metastases is the growing number of reports of patients in whom port-site implantation has developed.<sup>6-10</sup> It is uncommon, if reported at all, for metastasis to develop in a thoracotomy wound after "open" pulmonary metastasectomy. In fact, in one reported case, metastasis developed within a port site and not within the axillary thoracotomy wound.<sup>6</sup>

Herein we describe the cases of three additional patients with port-site metastasis following video-assisted thoracoscopic resection of pulmonary metastasis. In patient 3, it is worth noting that the specimen was placed in a plastic bag before its delivery through the middle port site, as is often recommended to prevent seeding. Metastasis developed in that site and in the posterior port site. In the second patient, the site of recurrence was the camera port and not the incision used for withdrawing the specimen.

**Conclusion**

In this report we add to the medical literature the cases of three additional patients in whom port-site metastasis developed following video-assisted thoracoscopic resection of pulmonary metastasis. We think that this technique has been extended inappropriately and that the results of this will deny 30% of patients the benefit of the removal of metastatic tumor. This occurs because of incomplete discovery and a consequent incomplete removal of the metastasis. Furthermore, there is an unacceptable incidence of port-site metastasis when compared with wound metastasis when open thoracotomy is used.

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